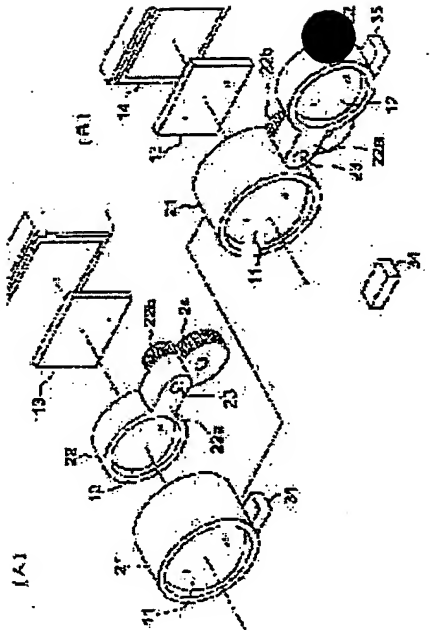

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(54) **TITLE: CAMERA**

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a camera constituted so that the front surface of a camera main body is made flat when the camera is not used because a lens barrel is smoothly collapsed much more than heretofore.
SOLUTION: This camera is equipped with a photographic lens constituted of a 1st lens group arranged on a subject side and a 2nd lens group arranged on an image forming surface side, a 1st moving means for moving the 1st lens group in an optical axis direction, a 2nd moving means for moving the 2nd lens group in a direction orthogonal to an optical axis, a 2nd detection means for detecting that the 2nd lens group is retreated to a specified position by the 2nd moving means, and a control means for controlling so that the 1st lens group may be retreated to a position on the optical axis where the 2nd lens group is arranged after the 2nd detection means detects that the 2nd lens group is retreated.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the camera made to collapse a lens barrel at the time of un-using it.

[0002]

[Description of the Prior Art] A large number [the camera with which the lens barrel holding a taking lens projects from the front face of the body of a camera]. In such a camera, although it is satisfactory in any way even if the lens barrel projects at the time of photography, if the lens barrel projects at the time of un-taking a photograph, it is inconvenient to a cellular phone, and the head of a lens barrel is applied to something, and failure may be produced.

[0003] Then, at the time of un-using it, retreat a lens barrel to an image formation side side, namely, it is made to collapse, and many cameras with which it was made for a lens barrel not to project from the front face of the body of a camera are known.

[0004] Moreover, a lens barrel and an image sensor are connected with a connection lever, and the configuration to which you make it collapsing of a lens barrel interlocked with, and an image sensor is evacuated mechanically is indicated by JP,11-258676,A.

[0005]

[Problem(s) to be Solved by the Invention] If a taking lens is used as a zoom lens, since lens number of sheets will increase, it becomes difficult to make all lenses collapse in the thickness of the body of a camera. However, if the lens barrel projects than the front face of the body of a camera, it will be caught at the time of carrying and will become obstructive.

[0006] In addition, since an image sensor is evacuated in the configuration of the disclosure to above-mentioned JP,11-258676,A and a lens barrel is made to collapse, even if it is the camera cone of a zoom lens, it is possible to make it fully collapse. However, in the configuration of this official report, since a connection lever must be arranged in the thickness of the body of a camera which the image sensor is slid and cannot take a large dimension further while moving a comparatively heavy zoom lens and its camera cone by manual operation, the connection lever is rotated in the condition that the distance from the supporting point and the supporting point to [from a power point] a point of application is very short. Therefore, although it can be operated on a document, it is difficult to perform smooth actuation actually.

[0007] By making this invention in view of this problem, evacuating some members of photography optical system in the direction which carries out an abbreviation rectangular cross with an optical axis, and moving other photography optical system to an opening with the member It is the camera it enabled it to make collapse a lens barrel in a big amount conventionally, and aims at proposing the camera which can carry out smooth actuation by driving electrically and controlling on the occasion of the migration.

[0008]

[Means for Solving the Problem] The above-mentioned object is attained by which the following means.

[0009] ** The taking lens which consisted of the 1st lens group arranged to the photographic subject side, and the 2nd lens group arranged to the image formation side side, The 1st migration means which moves said 1st lens group in the direction of an optical axis, and the 2nd migration means which moves said 2nd lens group in the direction which intersects perpendicularly with an optical axis, The 2nd detection means which detects that said 2nd lens group evacuated to the position with said 2nd migration means, The camera characterized by having the control means controlled in order to retreat said 1st lens group in the location on the optical axis with which said 2nd lens group is arranged, after said 2nd detection means detects evacuation of said

2nd lens group.
[0010] ** In the camera equipped with the photography optical system which has arranged the taking lens, the light filter, and the image sensor in order The 1st migration means which moves said taking lens in the direction of an optical axis, and the 2nd migration means which moves said light filter in the direction which intersects perpendicularly with an optical axis, The 2nd detection means which detects that said light filter evacuated to the position with said 2nd migration means, The camera characterized by having the control means controlled in order to retreat said taking lens in the location on the optical axis with which said light filter is arranged, after said 2nd detection means detects evacuation of said light filter.
[0011] ** In the camera equipped with the photography optical system which has arranged the taking lens, the light filter, and the image sensor in order The 1st migration means which moves said taking lens in the direction of an optical axis, and the 2nd migration means which moves said light filter and said image sensor in the direction which intersects perpendicularly with an optical axis, The 2nd detection means which detects that said light filter and said image sensor evacuated to the position with said 2nd migration means, The camera characterized by having the control means controlled in order to retreat said taking lens in the location on the optical axis with which said light filter is arranged, after said 2nd detection means detects evacuation of said light filter and said image sensor.

[0012]
[Embodiment of the Invention] The gestalt of three sorts of operations about the camera of this invention is explained with reference to drawing.
[0013] [the gestalt of the 1st operation] -- the bases of the gestalt of the 1st operation are first explained based on drawing 1 thru/or drawing 4 .
[0014] Drawing 1 is the perspective view of the photography optical system concerning the gestalt of the 1st operation, drawing when the chart on the left 1 (A) lets out a lens barrel at the time of photography, and right-hand side drawing 1 (B) are drawings when retreating a lens barrel and collapsing it at the time of un-taking a photograph, and a flow chart in case the block diagram and drawing 3 concerning the gestalt of this operation in drawing 2 make a lens barrel collapse, and drawing 4 are the flow charts when letting out a lens barrel.
[0015] For 11, as for a back group lens and 13, in drawing 1 , a pre-group lens and 12 are [a light filter (an infrared cut-off filter and optical low pass filter) and 14] CCD. Image formation of the photographic subject light is carried out to CCD14 with the taking lens constituted with the pre-group lens 11 and the back group lens 12, and photo electric translation is carried out. In addition, in order to prevent a false color and moire, the high frequency component of photographic subject light is removed by the light filter 13.
[0016] In addition, the taking lens which consists of a pre-group lens 11 and a back group lens 12 is a zoom lens, and if the pre-group lens 11 lets out from a collapsed state, it will let it out to the location (W location) of a wide angle most, and will let it out to the location of looking far most by zooming actuation after that.
[0017] Moreover, the pre-group lens 11 is held by the pre-group lens mirror frame 21, and the back group lens 12 is held by the back group lens mirror frame 22. And the pivot 23 has penetrated to right arm 22a of the back group lens mirror frame 22, and gearing 22b formed in the back of right arm 22a is engaging with the driver 24.
[0018] Next, actuation of a lens barrel is explained in accordance with the flow of drawing 3 and drawing 4 . Like drawing 1 (A), in the standard photography condition

which let out the lens barrel, it distinguishes (S11), and there is an input (Y of S11), and suppose that the switch was it power switch P-SW whether some switches had an input. And when power switch P-SW is inputted, (Y of S12) is rotated, CPU31 rotates the motor of the 2nd migration means 33, and a driver 24 is rotated counterclockwise. By this, since gearing 22b of the back group lens mirror frame 22 rotates clockwise, it rotates about 180 degrees clockwise with the back group lens 12, and the back group lens mirror frame 22 is evacuated from an optical axis like drawing 1 (B) (S13). Then, the 2nd detection means 35 detects evacuation of the back group lens mirror frame 22 (S14).

[0019] Consequently, since the place in which is ahead of a light filter 13 and the back group lens mirror frame 22 was located serves as an opening, CPU31 which acquired the detection signal from the 2nd detection means 35 rotates the motor of the 1st migration means 32, retreats the pre-group lens mirror frame 21 to the location of this opening, and is made to collapse (S15). In addition, although not illustrated, a detection means to detect that the pre-group lens mirror frame 21 retreated to the position actually is also required. and CPU31 boils and sets other circuits which are not illustrated as an OFF state (S16), and is turned off.

[0020] When there is no input in any switch, (N of S11), and CPU31 Moreover, predetermined time, For example, it judges whether it passed for 3 minutes (S17), and if the pre-group lens 11 is not W location when predetermined time progress is being carried out (Y of S17) (S18), the focal distance will be memorized in memory and the pre-group lens mirror frame 21 will be automatically retreated to W location (S19). And the monitor 36 which consists of a liquid crystal display panel is turned OFF automatically, and it changes into a low consumption condition. Moreover, if the pre-group lens 11 is already W location, a monitor 36 will be turned OFF as it is, and it will change into a low consumption condition.

[0021] Then, if the input of the switches (release switch R-SW, zoom switch Z-SW, monitor switch M-SW, etc.) of power switch P-SW or others is detected, a camera system will return to a standard photography condition from a low consumption condition, and will move a lens to the location memorized in memory. And CPU31 performs control according to the switch succeedingly. By doing in this way, power consumption can be reduced and the time lag for actuation can be shortened.

[0022] Moreover, there is a switch input (Y of S11), when the switch is not power switch P-SW, control of CPU31 corresponding to the switch having corresponded [(N of S12)] is performed (S21), and progress of predetermined time is distinguished (S17).

[0023] Moreover, when changing into the condition of having let out the lens barrel like drawing 1 (A) from the condition which collapsed the lens barrel like drawing 1 (B) at the time of photography If power switch P-SW is turned ON in drawing 4 , CPU31 starts each circuit including the circuit which is not illustrated, and is set as a standard photography condition (S32), and CPU31 will rotate the motor of the 1st migration means 32, and will let out the pre-group lens mirror frame 21 to W location (S33). Then, the 1st detection means 34 detects the delivery of the pre-group lens mirror frame 21 (S34).

[0024] Consequently, since the place in which the pre-group lens mirror frame 21 was located serves as an opening, CPU31 which acquired the detection signal from the 1st detection means 34 rotates the motor of the 2nd migration means 33, makes the location of this opening rotate the back group lens mirror frame 22, is inserted (S35), and is changed into a standard photography condition. In addition, although not illustrated, a detection means to detect that the back group lens mirror frame 22

rotated in the optical-axis location of the pre-group lens mirror frame 21 is also actually required.

[0025] In addition, a taking lens may not be limited to 2 group configurations, and may be the configuration of three or more groups. A taking lens shows a lens barrel example of 3 group configurations to drawing 5 and drawing 6 . A mimetic diagram when drawing 5 lets out a lens barrel, and drawing 6 are the mimetic diagrams at the time of making a lens barrel collapse.

[0026] The 2nd lens group and 43 are the 3rd lens groups, and in this taking lens, by letting out, while the 1st lens group 41 and the 2nd lens group 42 change mutual lens spacing, zooming is performed, and in both drawings, when the 3rd lens group 43 lets out, as for 41, a focus is performed, as for the 1st lens group and 42.

[0027] The 1st lens group 41 is held by the 1st lens mirror frame 44, the 2nd lens group 42 is held by the 2nd lens mirror frame 45, and the 3rd lens group 43 is held by the 3rd lens mirror frame 46. And although the cam cylinder 47 is held free [the revolution to a fixed drum 48] and not being illustrated, the cam cylinder 47 is carrying out cam engagement, respectively with the 1st lens mirror frame 44 and the 2nd lens mirror frame 45.

[0028] Here, when changing into the condition of having collapsed the lens barrel like drawing 6 from the condition which let out the lens barrel like drawing 5 at the time of photography, a motor is rotated like the above-mentioned, with the 3rd lens group 43, it is made to rotate about 180 degrees focusing on a pivot 49, and the 3rd lens mirror frame 46 is evacuated. Consequently, since the place in which the 3rd lens mirror frame 46 was located serves as an opening, the cam cylinder 47 is rotated, the 2nd lens mirror frame 45 is retreated to the location of this opening, and the 1st lens mirror frame 44 is further retreated to the opening in which the 2nd lens mirror frame 45 was located. Thus, since each mirror frame will move inside the cam cylinder 47, there is no effect of the member on others, and, moreover, it does not become unsightly by the exterior.

[0029] In addition, when changing into the condition of having let out the lens barrel like drawing 5 from the condition which collapsed the lens barrel like drawing 6 at the time of photography, it becomes actuation of above-mentioned reverse.

[0030] Moreover, although not illustrated, CPU controlled based on a detection means to detect that each mirror frame moved to the position, or this detection result is required like the above-mentioned.

[0031] Moreover, when a taking lens is three or more groups, the rearmost lens group may not not necessarily be evacuated, a middle lens group may be evacuated, and you may make it the configuration which retreats the lens group which is in the location ahead.

[0032] In addition, you may make it the configuration to which it is not necessary to not necessarily evacuate a lens group by revolution for example, and is made to evacuate by sliding.

[0033] Furthermore, the gestalt of this operation is not limited to a digital camera, and can be applied also to the camera loaded with a silver halide film.

[0034] Since each lens mirror frame can be rounded more greatly than before, the above enables it to constitute so that the front face of the body of a camera may become flat at the time of un-using it.

[0035] [Gestalt of the 2nd operation] drawing 7 is the perspective view of the photography optical system concerning the gestalt of the 2nd operation, the chart on the left 7 (A) is drawing when letting out a lens barrel at the time of photography, and right-hand side drawing 7 (B) is drawing when retreating a lens barrel and collapsing

at the time of un-taking a photograph.
[0036] For 51, as for a back group lens and 53, in drawing 7 , a pre-group lens and 52 are [a light filter (an infrared cut-off filter and optical low pass filter) and 54] CCD. Image formation of the photographic subject light is carried out to CCD54 with the taking lens constituted with the pre-group lens 51 and the back group lens 52, and photo electric translation is carried out.
[0037] Moreover, the pre-group lens 51 is held by the pre-group lens mirror frame 61, and the back group lens 52 is held by the back group lens mirror frame 62. Moreover, it was held with the light filter maintenance frame 63, the pivot 64 has penetrated to right arm 63a of the light filter maintenance frame 63, and gearing 63b formed in the back of right arm 63a is engaging the light filter 53 with the driver 65.
[0038] Here, when changing into the condition of having collapsed the lens barrel like drawing 7 (B) from the condition which let out the lens barrel like drawing 7 (A) at the time of photography, the motor which is not illustrated like the gestalt of the 1st operation is rotated, and a driver 65 is rotated counterclockwise. By this, since gearing 63b of the light filter maintenance frame 63 rotates clockwise, with a light filter 53, the light filter maintenance frame 63 rotates about 180 degrees clockwise, and is evacuated like drawing 7 (B). Then, the 2nd detection means 67 detects evacuation of the light filter maintenance frame 63.
[0039] consequently, since the place in which the light filter 53 was located serves as an opening, CPU which acquired the detection signal from the 2nd detection means 67 rotates the motor which is not illustrated, and retreats the back group lens mirror frame 62 to the location of this opening -- the pre-group lens mirror frame 61 is both also retreated.
[0040] Moreover, when changing into the condition of having let out the lens barrel like drawing 7 (A) from the condition which collapsed the lens barrel like drawing 7 (B) at the time of photography, CPU rotates a motor and lets out the pre-group lens mirror frame 61 and the back group lens mirror frame 62. Then, the 1st detection means 66 detects the delivery of the back group lens mirror frame 62.
[0041] Consequently, since the place in which the back group lens mirror frame 62 was located serves as an opening, CPU which acquired the detection signal from the 1st detection means 66 rotates a motor, makes the location of this opening rotate the light filter maintenance frame 63, is inserted, and makes the pre-group lens 51 and the back group lens 52, and an optical axis agree.
[0042] In addition, also in the gestalt of this operation, the block diagram of drawing 2 and drawing 3 , and the flow chart of 4 can be applied, replace the pre-group lens mirror frame in a flow chart with the pre-group lens mirror frame 61 and the back group lens mirror frame 62, and should just replace a back group lens mirror frame with the light filter maintenance frame 63.
[0043] Moreover, the taking lens in the gestalt of this operation may not be limited to 2 group configurations, and may be the configuration of one group, or may be the configuration of three or more groups.
[0044] Moreover, you may make it the configuration to which it is not necessary to not necessarily evacuate the light filter maintenance frame 63 by revolution for example, and is made to evacuate by sliding.
[0045] Since the pre-group lens mirror frame 61 can be retreated more greatly than before, the above enables it to constitute so that the front face of the body of a camera may become flat at the time of un-using it.
[0046] [Gestalt of the 3rd operation] drawing 8 is the perspective view of the photography optical system concerning the gestalt of the 3rd operation, the chart on

the left 8 (A) is drawing when letting out a lens barrel at the time of photography, and right-hand side drawing 8 (B) is drawing when retreating a lens barrel and collapsing at the time of un-taking a photograph.

[0047] For 71, as for a back group lens and 73, in drawing 8 , a pre-group lens and 72 are [a light filter (an infrared cut-off filter and optical low pass filter) and 74] CCD. Image formation of the photographic subject light is carried out to CCD74 with the taking lens constituted with the pre-group lens 71 and the back group lens 72, and photo electric translation is carried out.

[0048] Moreover, the pre-group lens 71 is held by the pre-group lens mirror frame 81, and the back group lens 72 is held by the back group lens mirror frame 82. Moreover, it was held in one with the maintenance frame 83, the pivot 84 has penetrated to right arm 83a of the maintenance frame 83, and gearing 83b formed in the back of right arm 83a is engaging a light filter 73 and CCD74 with the driver 85.

[0049] Here, when changing into the condition of having collapsed the lens barrel like drawing 8 (B) from the condition which let out the lens barrel like drawing 8 (A) at the time of photography, the motor which is not illustrated like the gestalt of the 1st operation is rotated, and a driver 85 is rotated counterclockwise. By this, since gearing 83b of the maintenance frame 83 rotates clockwise, with a light filter 73 and CCD74, the maintenance frame 43 rotates about 180 degrees clockwise, and is evacuated like drawing 8 (B). Then, the 2nd detection means 87 detects evacuation of the maintenance frame 83.

[0050] consequently, since the place in which a light filter 73 and CCD74 were located serves as an opening, CPU which acquired the detection signal from the 2nd detection means 87 rotates the motor which is not illustrated, and retreats the back group lens mirror frame 82 to the location of this opening -- the pre-group lens mirror frame 81 is both also retreated.

[0051] Moreover, when changing into the condition of having let out the lens barrel like drawing 8 (A) from the condition which collapsed the lens barrel like drawing 8 (B) at the time of photography, CPU rotates a motor and lets out the pre-group lens mirror frame 81 and the back group lens mirror frame 82. Then, the 1st detection means 86 detects the delivery of the back group lens mirror frame 82.

[0052] Consequently, since the place in which the back group lens mirror frame 82 was located serves as an opening, CPU which acquired the detection signal from the 1st detection means 86 rotates a motor, makes the location of this opening rotate the maintenance frame 83, is inserted, and makes the pre-group lens 71 and the back group lens 72, and an optical axis agree.

[0053] In addition, also in the gestalt of this operation, the block diagram of drawing 2 and drawing 3 , and the flow chart of 4 can be applied, replace the pre-group lens mirror frame in a flow chart with the pre-group lens mirror frame 81 and the back group lens mirror frame 82, and should just replace a back group lens mirror frame with the maintenance frame 83.

[0054] Moreover, the taking lens in the gestalt of this operation may not be limited to 2 group configurations, and may be the configuration of one group, or may be the configuration of three or more groups.

[0055] Moreover, you may make it the configuration to which it is not necessary to not necessarily evacuate the maintenance frame 83 by revolution for example, and is made to evacuate by sliding.

[0056] Since the pre-group lens mirror frame 81 and the back group lens mirror frame 82 can be retreated more greatly than before, the above enables it to constitute so that the front face of the body of a camera may become flat at the time of un-using it.

[0057] In addition, in drawing 1 and drawing 7 , although spacing of a light filter 13 and CCD14 and spacing of a light filter 53 and CCD54 are detached considerably and drawn, this is for expressing drawing clearly and is considerably close actually.
[0058] Furthermore, in the gestalt of each operation, it may replace with CCD 14, 54, and 74, and image sensors, such as CMOS, may be used.
[0059] Moreover, if the detection means 34, 35, 66, 67, 86, and 87 are the sensors which can detect a location also with photosensor or a switch, they are good anything.
[0060]
[Effect of the Invention] According to this invention, since a lens barrel can be made to collapse in a bigger amount than before, it becomes possible to constitute so that the front face of the body of a camera may become flat at the time of un-using it, and the actuation is also performed smoothly.

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view of the photography optical system concerning the gestalt of the 1st operation.
[Drawing 2] It is a block diagram concerning the gestalt of the 1st operation.
[Drawing 3] It is a flow chart at the time of making the lens barrel concerning the gestalt of the 1st operation collapse.
[Drawing 4] It is a flow chart when letting out the lens barrel concerning the gestalt of the 1st operation.
[Drawing 5] It is a mimetic diagram when letting out the lens barrel concerning the gestalt of the 1st operation.
[Drawing 6] It is a mimetic diagram at the time of making the lens barrel concerning the gestalt of the 1st operation collapse.
[Drawing 7] It is the perspective view of the photography optical system concerning the gestalt of the 2nd operation.
[Drawing 8] It is the perspective view of the photography optical system concerning the gestalt of the 3rd operation.
[Description of Notations]
11, 51, 71 Pre-group lens
12, 52, 72 After group lens
13, 53, 73 Light filter
14,54,74 CCD
21, 61, 81 Pre-group lens mirror frame
22, 62, 82 After group lens mirror frame
31 CPU
34, 66, 86 The 1st detection means
35, 67, 87 The 2nd detection means
41 1st Lens Group
42 2nd Lens Group
43 3rd Lens Group
44 1st Lens Mirror Frame
45 2nd Lens Mirror Frame
46 3rd Lens Mirror Frame
47 Cam Cylinder
63 Light Filter Maintenance Frame
83 Maintenance Frame

[Claims]

[Claim 1] The camera characterized by providing the following The taking lens which consisted of the 1st lens group arranged to the photographic subject side, and the 2nd lens group arranged to the image formation side side The 1st migration means which moves said 1st lens group in the direction of an optical axis The 2nd migration means which moves said 2nd lens group in the direction which intersects perpendicularly with an optical axis The control means controlled in order to retreat said 1st lens group in the location on the optical axis with which said 2nd lens group is arranged, after the 2nd detection means which detects that said 2nd lens group evacuated to the position with said 2nd migration means, and said 2nd detection means detect evacuation of said 2nd lens group

[Claim 2] It is the camera according to claim 1 with which it has the 1st detection means which detects that said 1st lens group moved forward with said 1st migration means to the position by the side of [an image formation side side to] a photographic subject, and said control means is characterized by controlling in order to make said 2nd lens group insert in the original location on an optical axis after said 1st detection means detects advance of said 1st lens group.

[Claim 3] It is the camera according to claim 1 or 2 characterized by to control in order have the power switch turned on and off in order to start and stop each circuit, said control means evacuates said 2nd lens group in the direction which intersects perpendicularly with an optical axis after detecting OFF of said power switch, and retreating said 1st lens group in the location on the optical axis with which said 2nd lens group is arranged.

[Claim 4] The camera equipped with the photography optical system which is characterized by providing the following and which has arranged the taking lens, the light filter, and the image sensor in order The 1st migration means which moves said taking lens in the direction of an optical axis The 2nd migration means which moves said light filter in the direction which intersects perpendicularly with an optical axis The 2nd detection means which detects that said light filter evacuated to the position with said 2nd migration means The control means controlled in order to retreat said taking lens in the location on the optical axis with which said light filter is arranged, after said 2nd detection means detects evacuation of said light filter

[Claim 5] It is the camera according to claim 4 with which it has the 1st detection means which detects that said taking lens moved forward with said 1st migration means to the position by the side of [an image formation side side to] a photographic subject, and said control means is characterized by controlling in order to make said light filter insert in the original location on an optical axis after said 1st detection means detects advance of said taking lens.

[Claim 6] It is the camera according to claim 4 or 5 characterized by controlling in order have the power switch turned on and off in order to start and stop each circuit, said control means evacuates said light filter in the direction which intersects perpendicularly with an optical axis after detecting OFF of said power switch, and to retreat said taking lens in the location on the optical axis with which said light filter is arranged.

[Claim 7] The camera equipped with the photography optical system which is characterized by providing the following and which has arranged the taking lens, the light filter, and the image sensor in order The 1st migration means which moves said taking lens in the direction of an optical axis The 2nd migration means which moves said light filter and said image sensor in the direction which intersects perpendicularly with an optical axis The 2nd detection means which detects that said light filter and said image sensor evacuated to the position with said 2nd migration means The

control means controlled in order to retreat said taking lens in the location on the optical axis with which said light filter is arranged, after said 2nd detection means detects evacuation of said light filter and said image sensor

[Claim 8] It is the camera according to claim 7 with which it has the 1st detection means which detects that said taking lens moved forward with said 1st migration means to the position by the side of [an image formation side side to] a photographic subject, and said control means is characterized by controlling in order to make said light filter and said image sensor insert in the original location on an optical axis after said 1st detection means detects advance of said taking lens.

[Claim 9] It is the camera according to claim 7 or 8 characterized by to control in order have the power switch turned on and off in order to start and stop each circuit, said control means evacuates said light filter and said image sensor in the direction which intersects perpendicularly with an optical axis after detecting OFF of said power switch, and to retreat said taking lens in the location on the optical axis with which said light filter and said image sensor are arranged.

[Claim 10] A camera given in any 1 term of claims 1-9 characterized by said 1st migration means and said 2nd migration means driving by the motor.

[Claim 11] A camera given in any 1 term of claims 1-10 characterized by said camera being a digital camera.

[Proposed Amendment]

[Claim(s)]

[Claim 1] The 1st lens group arranged to the photographic subject side, the 2nd lens group arranged to the image formation side side rather than said 1st lens group, And it has the taking lens which constitutes the zoom lens equipped with the 3rd lens group most arranged to the image formation side side. The camera which said taking lens is a camera movable in the direction of an optical axis from the location of a wide angle to the location of most looking far most, and is characterized by said 2nd lens group evacuating from on said optical axis when said taking lens moves to the collapsing position most rounded further from the location of a wide angle.

[Claim 2] Said 2nd lens group is a camera according to claim 1 characterized by evacuating from on said optical axis by moving in the direction which intersects perpendicularly with said optical axis.

[Claim 3] The camera according to claim 2 characterized by providing the following The 1st migration means which moves said 1st lens group in the direction of an optical axis The 2nd migration means which moves said 2nd lens group in the direction which intersects perpendicularly with an optical axis The 2nd detection means which detects that said 2nd lens group evacuated to the position with said 2nd migration means The control means controlled to move said 1st lens group to the location on the optical axis with which said 2nd lens group is arranged after said 2nd detection means detects evacuation of said 2nd lens group.

[Claim 4] The camera characterized by providing the following The taking lens which consisted of the 1st lens group arranged to the photographic subject side, and the 2nd lens group arranged to the image formation side side The 1st migration means which moves said 1st lens group in the direction of an optical axis The 2nd migration means which moves said 2nd lens group in the direction which intersects perpendicularly with an optical axis The control means controlled in order to retreat said 1st lens group in the location on the optical axis with which said 2nd lens group is arranged, after the 2nd detection means which detects that said 2nd lens group evacuated to the position with said 2nd migration means, and said 2nd detection means detect

evacuation of said 2nd lens group.

[Claim 5] It has the 1st detection means which detects that said 1st lens group moved forward with said 1st migration means to the position by the side of [an image formation side side to] a photographic subject. Said control means A camera given in any 1 term of claims 1-4 characterized by controlling in order to make said 2nd lens group insert in the original location on an optical axis after said 1st detection means detects advance of said 1st lens group.

[Claim 6] It is a camera given in any 1 term of claims 1-5 characterized by to control in order have the power switch turned on and off in order starting and stopping each circuit, said control means evacuates said 2nd lens group in the direction which intersects perpendicularly with an optical axis after detecting OFF of said power switch, and retreating said 1st lens group in the location on the optical axis with which said 2nd lens group has been arranged.

[Claim 7] The camera equipped with the photography optical system which is characterized by providing the following and which has arranged the taking lens, the light filter, and the image sensor in order The 1st migration means which moves said taking lens in the direction of an optical axis The 2nd migration means which moves said light filter in the direction which intersects perpendicularly with an optical axis The 2nd detection means which detects that said light filter evacuated to the position with said 2nd migration means The control means controlled in order to retreat said taking lens in the location on the optical axis with which said light filter is arranged, after said 2nd detection means detects evacuation of said light filter.

[Claim 8] It is the camera according to claim 7 with which it has the 1st detection means which detects that said taking lens moved forward with said 1st migration means to the position by the side of [an image formation side side to] a photographic subject, and said control means is characterized by controlling in order to make said light filter insert in the original location on an optical axis after said 1st detection means detects advance of said taking lens.

[Claim 9] It is the camera according to claim 7 or 8 characterized by controlling in order have the power switch turned on and off in order to start and stop each circuit, said control means evacuates said light filter in the direction which intersects perpendicularly with an optical axis after detecting OFF of said power switch, and to retreat said taking lens in the location on the optical axis with which said light filter is arranged.

[Claim 10] The camera equipped with the photography optical system which is characterized by providing the following and which has arranged the taking lens, the light filter, and the image sensor in order The 1st migration means which moves said taking lens in the direction of an optical axis The 2nd migration means which moves said light filter and said image sensor in the direction which intersects perpendicularly with an optical axis The 2nd detection means which detects that said light filter and said image sensor evacuated to the position with said 2nd migration means The control means controlled in order to retreat said taking lens in the location on the optical axis with which said light filter is arranged, after said 2nd detection means detects evacuation of said light filter and said image sensor.

[Claim 11] It is the camera according to claim 10 with which it has the 1st detection means which detects that said taking lens moved forward with said 1st migration means to the position by the side of [an image formation side side to] a photographic subject, and said control means is characterized by controlling in order to make said light filter and said image sensor insert in the original location on an optical axis after said 1st detection means detects advance of said taking lens.

[Claim 12] It is the camera according to claim 10 or 11 characterized by to control in order have the power switch turned on and off in order to start and stop each circuit, said control means evacuates said light filter and said image sensor in the direction which intersects perpendicularly with an optical axis after detecting OFF of said power switch, and to retreat said taking lens in the location on the optical axis with which said light filter and said image sensor are arranged.
[Claim 13] A camera given in any 1 term of claims 1-12 characterized by said 1st migration means and said 2nd migration means driving by the motor.
[Claim 14] A camera given in any 1 term of claims 1-13 characterized by said camera being a digital camera.
[Procedure amendment 2]
[Document to be Amended] Description
[Item(s) to be Amended] 0009
[Method of Amendment] Modification
[Proposed Amendment]
[0009] ** The 1st lens group arranged to the photographic subject side, the 2nd lens group arranged to the image formation side side rather than said 1st lens group, And it has the taking lens which constitutes the zoom lens equipped with the 3rd lens group most arranged to the image formation side side. The camera which said taking lens is a camera movable in the direction of an optical axis from the location of a wide angle to the location of most looking far most, and is characterized by said 2nd lens group evacuating from on said optical axis when said taking lens moves to the collapsing position most rounded further from the location of a wide angle.
[Procedure amendment 3]
[Document to be Amended] Description
[Item(s) to be Amended] 0010
[Method of Amendment] Modification
[Proposed Amendment]
[0010] The camera characterized by providing the following ** The taking lens which consisted of the 1st lens group arranged to the photographic subject side, and the 2nd lens group arranged to the image formation side side The 1st migration means which moves said 1st lens group in the direction of an optical axis The 2nd migration means which moves said 2nd lens group in the direction which intersects perpendicularly with an optical axis The control means controlled in order to retreat said 1st lens group in the location on the optical axis with which said 2nd lens group is arranged, after the 2nd detection means which detects that said 2nd lens group evacuated to the position with said 2nd migration means, and said 2nd detection means detect evacuation of said 2nd lens group
[Procedure amendment 4]
[Document to be Amended] Description
[Item(s) to be Amended] 0011
[Method of Amendment] Modification
[Proposed Amendment]
[0011] The camera equipped with the photography optical system which is characterized by providing the following and which has arranged ** taking lens, the light filter, and the image sensor in order The 1st migration means which moves said taking lens in the direction of an optical axis The 2nd migration means which moves said light filter in the direction which intersects perpendicularly with an optical axis The 2nd detection means which detects that said light filter evacuated to the position with said 2nd migration means The control means controlled in order to retreat said

taking lens in the location on the optical axis with which said light filter is arranged, after said 2nd detection means detects evacuation of said light filter.

The camera equipped with the photography optical system which is characterized by providing the following and which has arranged ** taking lens, the light filter, and the image sensor in order The 1st migration means which moves said taking lens in the direction of an optical axis The 2nd migration means which moves said light filter and said image sensor in the direction which intersects perpendicularly with an optical axis The 2nd detection means which detects that said light filter and said image sensor evacuated to the position with said 2nd migration means The control means controlled in order to retreat said taking lens in the location on the optical axis with which said light filter is arranged, after said 2nd detection means detects evacuation of said light filter and said image sensor.

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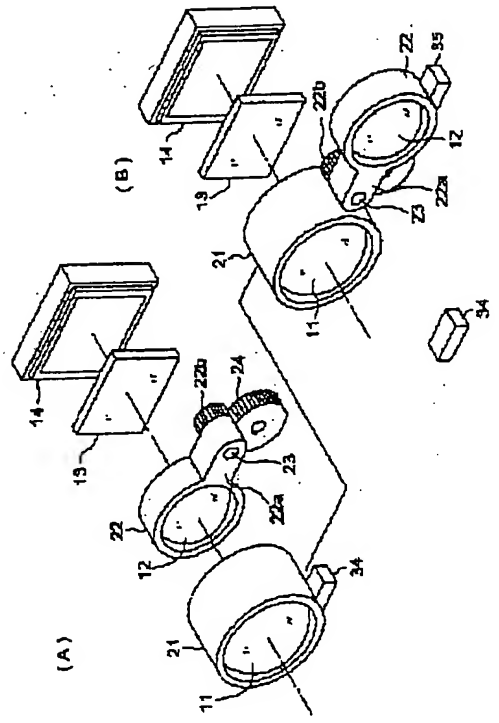
最終頁に続く

(54)【発明の名称】　カメラ

(57)【要約】
【課題】　レンズ鏡胴を従来より大きな量で沈胴させることができるので、非使用時にはカメラ本体の前面が平坦になるように構成することが可能になり、且つその作動も円滑に行われるカメラ。
【解決手段】　被写体側に配置した第１のレンズ群、及び結像面側に配置した第２のレンズ群から構成された撮影レンズと、第１のレンズ群を光軸方向に移動させる第１の移動手段と、第２のレンズ群を光軸と直交する方向に移動させる第２の移動手段と、第２の移動手段により第２のレンズ群が所定の位置に退避したことを検知する第２の検知手段と、第２の検知手段が第２のレンズ群の退避を検知した後に、第１のレンズ群を第２のレンズ群が配置されていた光軸上の位置に後退させるべく制御する制御手段を備えたこと。



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【特許請求の範囲】

【請求項1】　被写体側に配置した第1のレンズ群、及び結像面側に配置した第2のレンズ群から構成された撮影レンズと、前記第1のレンズ群を光軸方向に移動させる第1の移動手段と、前記第2のレンズ群を光軸と直交する方向に移動させる第2の移動手段と、前記第2の移動手段により前記第2のレンズ群が所定の位置に退避したことを検知する第2の検知手段と、前記第2の検知手段が前記第2のレンズ群の退避を検知した後に、前記第1のレンズ群を前記第2のレンズ群が配置されていた光軸上の位置に後退させるべく制御する制御手段と、を備えたことを特徴とするカメラ。

【請求項2】　前記第1の移動手段により前記第1のレンズ群が結像面側から被写体側の所定の位置に前進したことを検知する第1の検知手段を備え、前記制御手段は、前記第1の検知手段が前記第1のレンズ群の前進を検知した後に、前記第2のレンズ群を光軸上の原位置に挿入させるべく制御することを特徴とする請求項1に記載のカメラ。

【請求項3】　各回路を起動及び停止させるべくオン・オフするパワースイッチを備え、前記制御手段は、前記パワースイッチのオフを検出してから、前記第2のレンズ群を光軸と直交する方向に退避させ、前記第1のレンズ群を前記第2のレンズ群が配置されていた光軸上の位置に後退させるべく制御することを特徴とする請求項1又は請求項2に記載のカメラ。

【請求項4】　撮影レンズ、光学フィルタ、撮像素子を順に配置した撮影光学系を備えたカメラにおいて、前記撮影レンズを光軸方向に移動する第1の移動手段と、前記光学フィルタを光軸と直交する方向に移動する第2の移動手段と、前記第2の移動手段により前記光学フィルタが所定の位置に退避したことを検知する第2の検知手段と、前記第2の検知手段が前記光学フィルタの退避を検知した後に、前記撮影レンズを前記光学フィルタが配置されていた光軸上の位置に後退させるべく制御する制御手段と、を備えたことを特徴とするカメラ。

【請求項5】　前記第1の移動手段により前記撮影レンズが結像面側から被写体側の所定の位置に前進したことを検知する第1の検知手段を備え、前記制御手段は、前記第1の検知手段が前記撮影レンズの前進を検知した後に、前記光学フィルタを光軸上の原位置に挿入させるべく制御することを特徴とする請求項4に記載のカメラ。

【請求項6】　各回路を起動及び停止させるべくオン・オフするパワースイッチを備え、前記制御手段は、前記パワースイッチのオフを検出してから、前記光学フィルタを光軸と直交する方向に退避させ、前記撮影レンズを前記光学フィルタが配置されていた光軸上の位置に後退させるべく制御することを特徴とする請求項4又は請求項5に記載のカメラ。

【請求項7】　撮影レンズ、光学フィルタ、撮像素子を

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順に配置した撮影光学系を備えたカメラにおいて、前記撮影レンズを光軸方向に移動する第1の移動手段と、前記光学フィルタ及び前記撮像素子を光軸と直交する方向に移動する第2の移動手段と、前記第2の移動手段により前記光学フィルタ及び前記撮像素子が所定の位置に退避したことを検知する第2の検知手段と、前記第2の検知手段が前記光学フィルタ及び前記撮像素子の退避を検知した後に、前記撮影レンズを前記光学フィルタが配置されていた光軸上の位置に後退させるべく制御する制御手段と、を備えたことを特徴とするカメラ。

【請求項8】　前記第1の移動手段により前記撮影レンズが結像面側から被写体側の所定の位置に前進したことを検知する第1の検知手段を備え、前記制御手段は、前記第1の検知手段が前記撮影レンズの前進を検知した後に、前記光学フィルタ及び前記撮像素子を光軸上の原位置に挿入させるべく制御することを特徴とする請求項7に記載のカメラ。

【請求項9】　各回路を起動及び停止させるべくオン・オフするパワースイッチを備え、前記制御手段は、前記パワースイッチのオフを検出してから、前記光学フィルタ及び前記撮像素子を光軸と直交する方向に退避させ、前記撮影レンズを前記光学フィルタ及び前記撮像素子が配置されていた光軸上の位置に後退させるべく制御することを特徴とする請求項7又は請求項8に記載のカメラ。

【請求項10】　前記第1の移動手段及び前記第2の移動手段がモータによって駆動されることを特徴とする請求項1～9の何れか1項に記載のカメラ。

【請求項11】　前記カメラがデジタルカメラであることを特徴とする請求項1～10の何れか1項に記載のカメラ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、非使用時にレンズ鏡胴を沈胴させるカメラに関する。

【0002】

【従来の技術】撮影レンズを保持するレンズ鏡胴がカメラ本体の前面より突出しているカメラが多数ある。このようなカメラにおいて、撮影時にはレンズ鏡胴が突出していても何ら問題はないが、非撮影時にレンズ鏡胴が突出していると携帯に不便であり、レンズ鏡胴の先端を何かに当てて故障を生じさせることもある。

【0003】そこで、非使用時にはレンズ鏡胴を結像面側に後退させて、即ち沈胴させて、レンズ鏡胴がカメラ本体の前面より突出しないようにしたカメラが多数知られている。

【0004】また、レンズ鏡胴と撮像素子とを連結レバーで接続し、レンズ鏡胴の沈胴に連動させて撮像素子を機械的に退避させる構成が特開平11-258676号公報に開示されている。

【0005】
【発明が解決しようとする課題】撮影レンズをズームレンズにすると、レンズ枚数が増加するので、全てのレンズをカメラ本体の厚みの中に沈胴させることは困難になる。しかし、レンズ鏡胴がカメラ本体の前面より少しでも突出していると、携帯時に引っかかって邪魔になる。
【0006】なお、上述の特開平11-258676号公報に開示の構成においては、撮像素子を退避させてレンズ鏡胴を沈胴させるので、ズームレンズの鏡胴であっても充分に沈胴させることが可能である。しかし、この公報の構成においては、手動操作で比較的重いズームレンズ及びその鏡胴を移動させると共に、撮像素子を摺動させており、更に、寸法が大きく取れないカメラ本体の厚みの中に連結レバーを配置しなければならないので、力点から支点及び支点から作用点までの距離が非常に短い状態で連結レバーを回転させている。従って、書面の上では操作が行えるが、実際には円滑な操作を行うのは困難である。
【0007】本発明はかかる問題に鑑みてなされたものであり、撮影光学系の一部の部材を光軸と略直交する方向に退避させ、その部材があった空隙に他の撮影光学系を移動させることにより、従来よりレンズ鏡胴を大きな量で沈胴させることができるようにしたカメラであって、その移動に際して電気的に駆動し制御することによって円滑な操作をすることができるカメラを提案することを目的とする。
【0008】
【課題を解決するための手段】上記目的は下記の何れかの手段により達成される。
【0009】①被写体側に配置した第1のレンズ群、及び結像面側に配置した第2のレンズ群から構成された撮影レンズと、前記第1のレンズ群を光軸方向に移動させる第1の移動手段と、前記第2のレンズ群を光軸と直交する方向に移動させる第2の移動手段と、前記第2の移動手段により前記第2のレンズ群が所定の位置に退避したことを検知する第2の検知手段と、前記第2の検知手段が前記第2のレンズ群の退避を検知した後に、前記第1のレンズ群を前記第2のレンズ群が配置されていた光軸上の位置に後退させるべく制御する制御手段と、を備えたことを特徴とするカメラ。
【0010】②撮影レンズ、光学フィルタ、撮像素子を順に配置した撮影光学系を備えたカメラにおいて、前記撮影レンズを光軸方向に移動する第1の移動手段と、前記光学フィルタを光軸と直交する方向に移動する第2の移動手段と、前記第2の移動手段により前記光学フィルタが所定の位置に退避したことを検知する第2の検知手段と、前記第2の検知手段が前記光学フィルタの退避を検知した後に、前記撮影レンズを前記光学フィルタが配置されていた光軸上の位置に後退させるべく制御する制御手段と、を備えたことを特徴とするカメラ。
【0011】③撮影レンズ、光学フィルタ、撮像素子を順に配置した撮影光学系を備えたカメラにおいて、前記撮影レンズを光軸方向に移動する第1の移動手段と、前記光学フィルタ及び前記撮像素子を光軸と直交する方向に移動する第2の移動手段と、前記第2の移動手段により前記光学フィルタ及び前記撮像素子が所定の位置に退避したことを検知する第2の検知手段と、前記第2の検知手段が前記光学フィルタ及び前記撮像素子の退避を検知した後に、前記撮影レンズを前記光学フィルタが配置されていた光軸上の位置に後退させるべく制御する制御手段と、を備えたことを特徴とするカメラ。
【0012】
【発明の実施の形態】本発明のカメラに関する3種の実施の形態を図を参照して説明する。
【0013】［第1の実施の形態］先ず、第1の実施の形態の基本を図1乃至図4に基づいて説明する。
【0014】図1は第1の実施の形態に係わる撮影光学系の斜視図であり、左側の図1（A）は撮影時にレンズ鏡胴を繰り出したときの図、右側の図1（B）は非撮影時にレンズ鏡胴を後退させて沈胴したときの図であり、図2は本実施の形態に係わるブロック図、図3はレンズ鏡胴を沈胴させるときのフローチャート、図4はレンズ鏡胴を繰り出すときのフローチャートである。
【0015】図1において、11は前群レンズ、12は後群レンズ、13は光学フィルタ（赤外カットフィルタ及びオプチカルローパスフィルタ）、14はCCDである。被写体光は前群レンズ11及び後群レンズ12とにより構成された撮影レンズによりCCD14に結像して光電変換される。なお、偽色やモアレを防止するため、被写体光の高周波成分は光学フィルタ13によって除去される。
【0016】なお、前群レンズ11及び後群レンズ12で構成される撮影レンズはズームレンズであって、前群レンズ11が沈胴状態から繰り出されると、最も広角の位置（W位置）に繰り出され、その後、ズーミング操作によって最も望遠の位置まで繰り出される。
【0017】また、前群レンズ11は前群レンズ鏡枠21によって保持され、後群レンズ12は後群レンズ鏡枠22によって保持されている。そして、後群レンズ鏡枠22の右腕22aには支軸23が貫通しており、右腕22aの後部に形成された歯車22bが駆動歯車24と歯合している。
【0018】次に、レンズ鏡胴の動作を図3及び図4のフローに沿って説明する。図1（A）の如くレンズ鏡胴を繰り出した標準撮影状態において、何かのスイッチに入力があったか否かを判別し（S11）、入力があり（S11のY）、そのスイッチがパワースイッチP-SWであったとする。そして、パワースイッチP-SWが入力されたときは（S12のY）、CPU31は第2移動手段33のモータを回転させて、駆動歯車24を反時

計方向に回転させる。これによって、後群レンズ鏡枠22の歯車22bが時計方向に回転するので、後群レンズ鏡枠22は後群レンズ12と共に時計方向に約180度回転して、図1（B）の如く光軸から退避する（S13）。すると、後群レンズ鏡枠22の退避を第2検知手段35が検知する（S14）。

【0019】この結果、光学フィルタ13の前方にあって後群レンズ鏡枠22が位置していた所が空隙となるので、第2検知手段35からの検知信号を得たCPU31は第1移動手段32のモータを回転させて、前群レンズ鏡枠21をこの空隙の位置まで後退させて沈胴させる（S15）。なお、図示していないが、実際には前群レンズ鏡枠21が所定の位置に後退したことを検知する検知手段も必要である。そして、CPU31は図示してない他の回路もオフ状態にに設定して（S16）、オフ状態になる。

【0020】また、何れのスイッチにも入力がなかったときは（S11のN）、CPU31は所定時間、例えば3分間経過したか否かを判断し（S17）、所定時間経過していた場合（S17のY）、前群レンズ11がW位置でなければ（S18）、その焦点距離をメモリに記憶して、前群レンズ鏡枠21をW位置まで自動的に後退させる（S19）。そして、液晶表示板からなるモニタ36を自動的にオフにして、低消費状態にする。また、既に前群レンズ11がW位置ならば、そのままモニタ36をオフにして、低消費状態にする。

【0021】この後、パワースイッチP－SWやその他のスイッチ（レリーズスイッチR－SW、ズームスイッチZ－SW、モニタスイッチM－SW等）の入力を検知すると、カメラシステムは低消費状態から標準撮影状態に復帰し、メモリに記憶してある位置にレンズを移動する。そして、CPU31はそのスイッチに応じた制御を引き続き行う。このようにすることによって、消費電力を低減させることができ、操作のためのタイムラグを短縮することができる。

【0022】また、スイッチ入力があり（S11のY）、そのスイッチがパワースイッチP－SWでなかったときは（S12のN）、CPU31はそのスイッチに応じた制御を行い（S21）、所定時間の経過を判別する（S17）。

【0023】また、図1（B）の如きレンズ鏡胴を沈胴した状態から図1（A）の如く撮影時にレンズ鏡胴を繰り出した状態にするときは、図4においてパワースイッチP－SWをオンにすると、CPU31は図示していない回路を含めた各回路を起動させて標準撮影状態に設定し（S32）、CPU31は第1移動手段32のモータを回転させて、前群レンズ鏡枠21をW位置まで繰り出す（S33）。すると、前群レンズ鏡枠21の繰り出しを第1検知手段34が検知する（S34）。

【0024】この結果、前群レンズ鏡枠21が位置していた所が空隙となるので、第1検知手段34からの検知信号を得たCPU31は第2移動手段33のモータを回転させて、後群レンズ鏡枠22をこの空隙の位置に回転させて挿入し（S35）、標準撮影状態にする。なお、図示していないが、実際には後群レンズ鏡枠22が前群レンズ鏡枠21の光軸位置に回転したことを検知する検知手段も必要である。

【0025】なお、撮影レンズは2群構成に限定されるものではなく、3群以上の構成であってもよい。撮影レンズが3群構成のレンズ鏡胴一例を図5及び図6に示す。図5はレンズ鏡胴を繰り出したときの模式図、図6はレンズ鏡胴を沈胴させたときの模式図である。

【0026】両図において、41は第1レンズ群、42は第2レンズ群、43は第3レンズ群であり、本撮影レンズにおいては、第1レンズ群41及び第2レンズ群42が互いのレンズ間隔を変化させながら繰り出されることによってズーミングが行われ、第3レンズ群43が繰り出されることによってフォーカスが行われる。

【0027】第1レンズ群41は第1レンズ鏡枠44によって保持され、第2レンズ群42は第2レンズ鏡枠45によって保持され、第3レンズ群43は第3レンズ鏡枠46によって保持されている。そして、カム筒47が固定胴48に回転自在に保持されていて、図示していないが、カム筒47は第1レンズ鏡枠44及び第2レンズ鏡枠45とそれぞれカム係合している。

【0028】ここで、図5の如く撮影時にレンズ鏡胴を繰り出した状態から図6の如きレンズ鏡胴を沈胴した状態にするときは、前述と同様にモータを回転させて、第3レンズ鏡枠46を第3レンズ群43と共に支軸49を中心に約180度回転させて退避させる。この結果、第3レンズ鏡枠46が位置していた所が空隙となるので、カム筒47を回転させて第2レンズ鏡枠45をこの空隙の位置まで後退させ、更に、第2レンズ鏡枠45が位置していた空隙に第1レンズ鏡枠44を後退させる。このように、カム筒47の内部で各鏡枠が移動することになるので、他の部材への影響がなく、しかも外観上で見苦しくなることもない。

【0029】なお、図6の如きレンズ鏡胴を沈胴した状態から図5の如く撮影時にレンズ鏡胴を繰り出した状態にするときは、上述の逆の動作になる。

【0030】また、図示していないが、前述の如く各鏡枠が所定の位置に移動したことを検知する検知手段やこの検知結果に基づいて制御するCPUは必要である。

【0031】また、撮影レンズが3群以上のときは、必ずしも最も後のレンズ群を退避させなくてもよく、中間のレンズ群を退避させて、その位置に前方にあるレンズ群を後退させる構成にしてもよい。

【0032】その他に、必ずしもレンズ群を回転により退避させなくてもよく、例えば摺動によって退避させる構成にしてもよい。

【００３３】更に、本実施の形態はデジタルカメラに限定されるものではなく、銀塩フィルムを装填するカメラにも適用できる。

【００３４】以上により、各レンズ鏡枠を従来より大きく繰り込むことができるので、非使用時にはカメラ本体の前面が平坦になるように構成することが可能になる。

【００３５】［第２の実施の形態］図７は第２の実施の形態に係わる撮影光学系の斜視図であり、左側の図７（Ａ）は撮影時にレンズ鏡胴を繰り出したときの図であり、右側の図７（Ｂ）は非撮影時にレンズ鏡胴を後退させて沈胴したときの図である。

【００３６】図７において、５１は前群レンズ、５２は後群レンズ、５３は光学フィルタ（赤外カットフィルタ及びオプチカルローパスフィルタ）、５４はＣＣＤである。被写体光は前群レンズ５１及び後群レンズ５２とにより構成された撮影レンズによりＣＣＤ５４に結像して光電変換される。

【００３７】また、前群レンズ５１は前群レンズ鏡枠６１によって保持され、後群レンズ５２は後群レンズ鏡枠６２によって保持されている。また、光学フィルタ５３は光学フィルタ保持枠６３によって保持され、光学フィルタ保持枠６３の右腕６３ａには支軸６４が貫通しており、右腕６３ａの後部に形成された歯車６３ｂが駆動歯車６５と歯合している。

【００３８】ここで、図７（Ａ）の如く撮影時にレンズ鏡胴を繰り出した状態から図７（Ｂ）の如きレンズ鏡胴を沈胴した状態にするときは、第１の実施の形態と同様に図示してないモータを回転させて、駆動歯車６５を反時計方向に回転させる。これによって、光学フィルタ保持枠６３の歯車６３ｂが時計方向に回転するので、光学フィルタ保持枠６３は光学フィルタ５３と共に時計方向に約１８０度回転して図７（Ｂ）の如く退避する．すると、光学フィルタ保持枠６３の退避を第２検知手段６７が検知する。

【００３９】この結果、光学フィルタ５３が位置していた所が空隙となるので、第２検知手段６７からの検知信号を得たＣＰＵは図示していないモータを回転させて、後群レンズ鏡枠６２をこの空隙の位置まで後退させる共に、前群レンズ鏡枠６１も後退させる。

【００４０】また、図７（Ｂ）の如きレンズ鏡胴を沈胴した状態から図７（Ａ）の如く撮影時にレンズ鏡胴を繰り出した状態にするときは、ＣＰＵはモータを回転させて、前群レンズ鏡枠６１及び後群レンズ鏡枠６２を繰り出す．すると、後群レンズ鏡枠６２の繰り出しを第１検知手段６６が検知する。

【００４１】この結果、後群レンズ鏡枠６２が位置していた所が空隙となるので、第１検知手段６６からの検知信号を得たＣＰＵはモータを回転させて、光学フィルタ保持枠６３をこの空隙の位置に回転させて挿入し、前群レンズ５１及び後群レンズ５２と光軸を合致させる。

【００４２】なお、本実施の形態においても図２のブロック図、及び図３，４のフローチャートは適用でき、フローチャートにおける前群レンズ鏡枠を前群レンズ鏡枠６１及び後群レンズ鏡枠６２と置き換え、後群レンズ鏡枠を光学フィルタ保持枠６３と置き換えればよい。

【００４３】また、本実施の形態における撮影レンズは２群構成に限定されるものではなく、１群の構成であっても３群以上の構成であってもよい。

【００４４】また、必ずしも光学フィルタ保持枠６３を回転により退避させなくてもよく、例えば摺動によって退避させる構成にしてもよい。

【００４５】以上により、前群レンズ鏡枠６１を従来より大きく後退させることができるので、非使用時にはカメラ本体の前面が平坦になるように構成することが可能になる。

【００４６】［第３の実施の形態］図８は第３の実施の形態に係わる撮影光学系の斜視図であり、左側の図８（Ａ）は撮影時にレンズ鏡胴を繰り出したときの図であり、右側の図８（Ｂ）は非撮影時にレンズ鏡胴を後退させて沈胴したときの図である。

【００４７】図８において、７１は前群レンズ、７２は後群レンズ、７３は光学フィルタ（赤外カットフィルタ及びオプチカルローパスフィルタ）、７４はＣＣＤである。被写体光は前群レンズ７１及び後群レンズ７２とにより構成された撮影レンズによりＣＣＤ７４に結像して光電変換される。

【００４８】また、前群レンズ７１は前群レンズ鏡枠８１によって保持され、後群レンズ７２は後群レンズ鏡枠８２によって保持されている。また、光学フィルタ７３及びＣＣＤ７４は保持枠８３によって一体的に保持され、保持枠８３の右腕８３ａには支軸８４が貫通しており、右腕８３ａの後部に形成された歯車８３ｂが駆動歯車８５と歯合している。

【００４９】ここで、図８（Ａ）の如く撮影時にレンズ鏡胴を繰り出した状態から図８（Ｂ）の如きレンズ鏡胴を沈胴した状態にするときは、第１の実施の形態と同様に図示してないモータを回転させて、駆動歯車８５を反時計方向に回転させる。これによって、保持枠８３の歯車８３ｂが時計方向に回転するので、保持枠４３は光学フィルタ７３及びＣＣＤ７４と共に時計方向に約１８０度回転して図８（Ｂ）の如く退避する．すると、保持枠８３の退避を第２検知手段８７が検知する。

【００５０】この結果、光学フィルタ７３及びＣＣＤ７４が位置していた所が空隙となるので、第２検知手段８７からの検知信号を得たＣＰＵは図示していないモータを回転させて、後群レンズ鏡枠８２をこの空隙の位置まで後退させる共に、前群レンズ鏡枠８１も後退させる。

【００５１】また、図８（Ｂ）の如きレンズ鏡胴を沈胴した状態から図８（Ａ）の如く撮影時にレンズ鏡胴を繰り出した状態にするときは、ＣＰＵはモータを回転させ

て、前群レンズ鏡枠８１及び後群レンズ鏡枠８２を繰り出す。すると、後群レンズ鏡枠８２の繰り出しを第１検知手段８６が検知する。

【００５２】この結果、後群レンズ鏡枠８２が位置していた所が空隙となるので、第１検知手段８６からの検知信号を得たＣＰＵはモータを回転させて、保持枠８３をこの空隙の位置に回転させて挿入し、前群レンズ７１及び後群レンズ７２と光軸を合致させる。

【００５３】なお、本実施の形態においても図２のブロック図、及び図３，４のフローチャートは適用でき、フローチャートにおける前群レンズ鏡枠を前群レンズ鏡枠８１及び後群レンズ鏡枠８２と置き換え、後群レンズ鏡枠を保持枠８３と置き換えればよい。

【００５４】また、本実施の形態における撮影レンズは２群構成に限定されるものではなく、１群の構成であっても３群以上の構成であってもよい。

【００５５】また、必ずしも保持枠８３を回転により退避させなくてもよく、例えば摺動によって退避させる構成にしてもよい。

【００５６】以上により、前群レンズ鏡枠８１及び後群レンズ鏡枠８２を従来より大きく後退させることができるので、非使用時にはカメラ本体の前面が平坦になるように構成することが可能になる。

【００５７】なお、図１及び図７において、光学フィルタ１３とＣＣＤ１４との間隔、及び光学フィルタ５３とＣＣＤ５４との間隔をかなり離して描いてあるが、これは図を明瞭に表現するためであって、実際にはかなり近接している。

【００５８】更に、各実施の形態において、ＣＣＤ１４，５４，７４に代えてＣＭＯＳ等の撮像素子を用いてもよい。

【００５９】また、検知手段３４，３５，６６，６７，８６，８７はフォトセンサでもスイッチでも、位置を検知できるセンサなら何でもよい。

【００６０】

【発明の効果】本発明によれば、レンズ鏡胴を従来より大きな量で沈胴させることができるので、非使用時にはカメラ本体の前面が平坦になるように構成することが可能になり、且つその作動も円滑に行われる。

【図面の簡単な説明】

【図１】第１の実施の形態に係わる撮影光学系の斜視図である。

【図２】第１の実施の形態に係わるブロック図である。

【図３】第１の実施の形態に係わるレンズ鏡胴を沈胴させるときのフローチャートである。

【図４】第１の実施の形態に係わるレンズ鏡胴を繰り出すときのフローチャートである。

【図５】第１の実施の形態に係わるレンズ鏡胴を繰り出したときの模式図である。

【図６】第１の実施の形態に係わるレンズ鏡胴を沈胴させたときの模式図である。

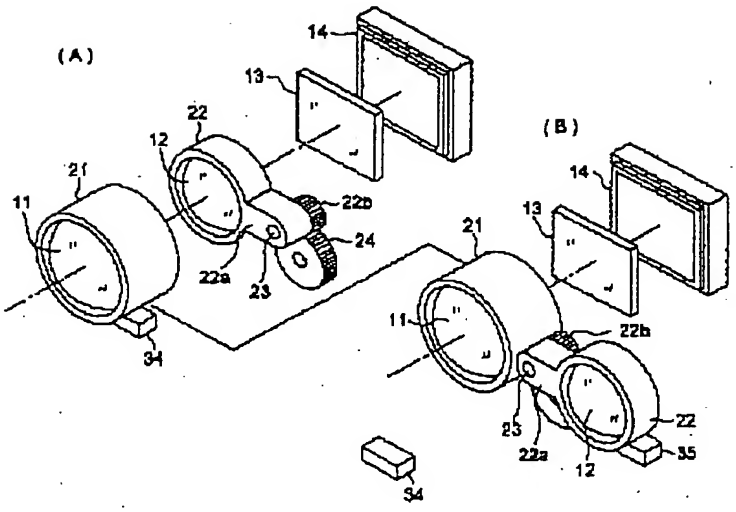
【図７】第２の実施の形態に係わる撮影光学系の斜視図である。

【図８】第３の実施の形態に係わる撮影光学系の斜視図である。

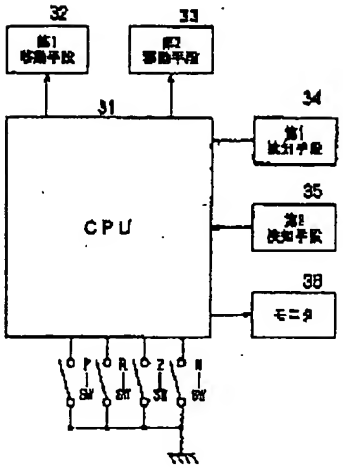
【符号の説明】

１１，５１，７１　前群レンズ
１２，５２，７２　後群レンズ
１３，５３，７３　光学フィルタ
１４，５４，７４　ＣＣＤ
２１，６１，８１　前群レンズ鏡枠
２２，６２，８２　後群レンズ鏡枠
３１　ＣＰＵ
３４，６６，８６　第１検知手段
３５，６７，８７　第２検知手段
４１　第１レンズ群
４２　第２レンズ群
４３　第３レンズ群
４４　第１レンズ鏡枠
４５　第２レンズ鏡枠
４６　第３レンズ鏡枠
４７　カム筒
６３　光学フィルタ保持枠
８３　保持枠

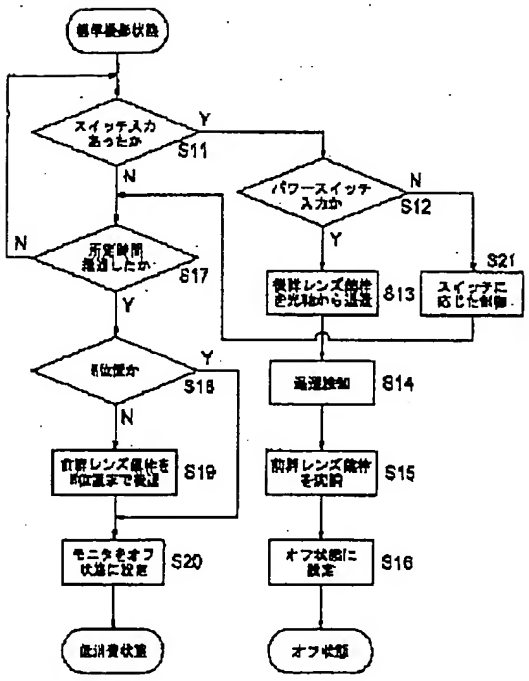
【図1】


(A)
(B)
11
12
13
14
21
22
22a
22b
23
24
31
34
35

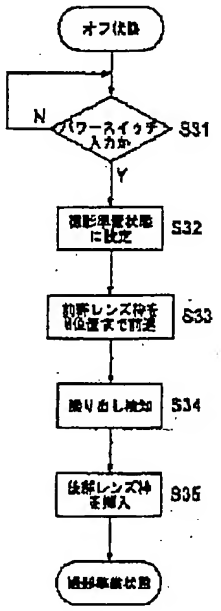
【図2】


32
33
34
35
36
31
CPU
モニタ

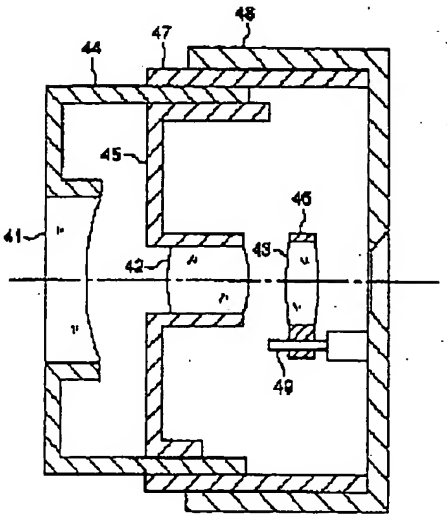
【図3】


スイッチ入力あったか
S11
パワースイッチ入力か
S12
所定時間経過したか
S17
S13
S21
S18
S14
S19
S15
S20
S16

【図4】


オフ状態
パワースイッチ入力か
S31
S32
S33
S34
S35

【図5】


41
42
43
44
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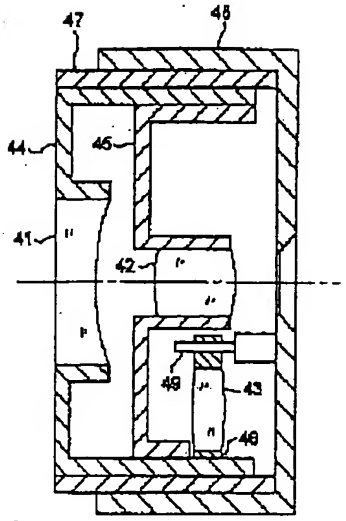
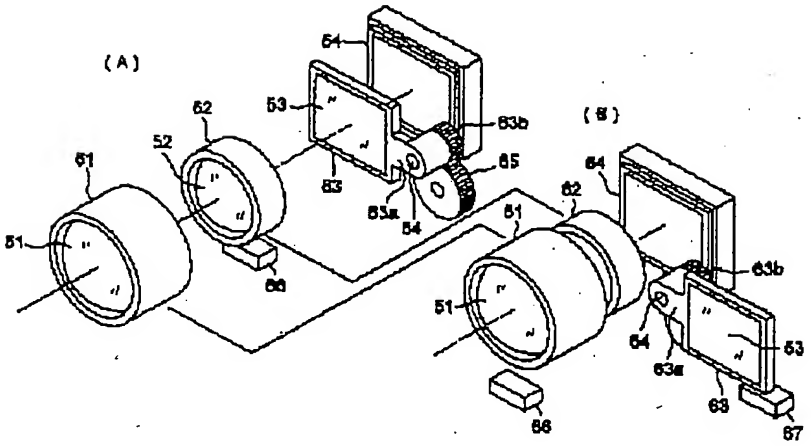
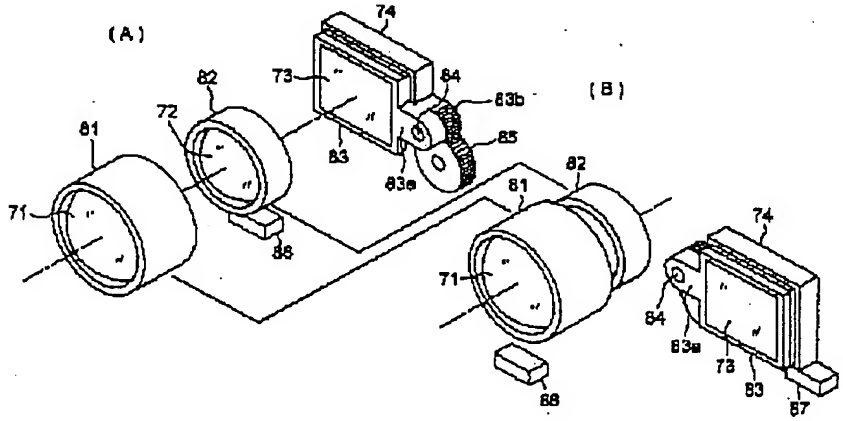
【図6】



【図7】



【図8】



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Fターム(参考) 2H101 BB07 BB08 DD02 DD03 DD05
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DD58 DD62 DD65 DD66 EE00
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AC69 AC74 AC78